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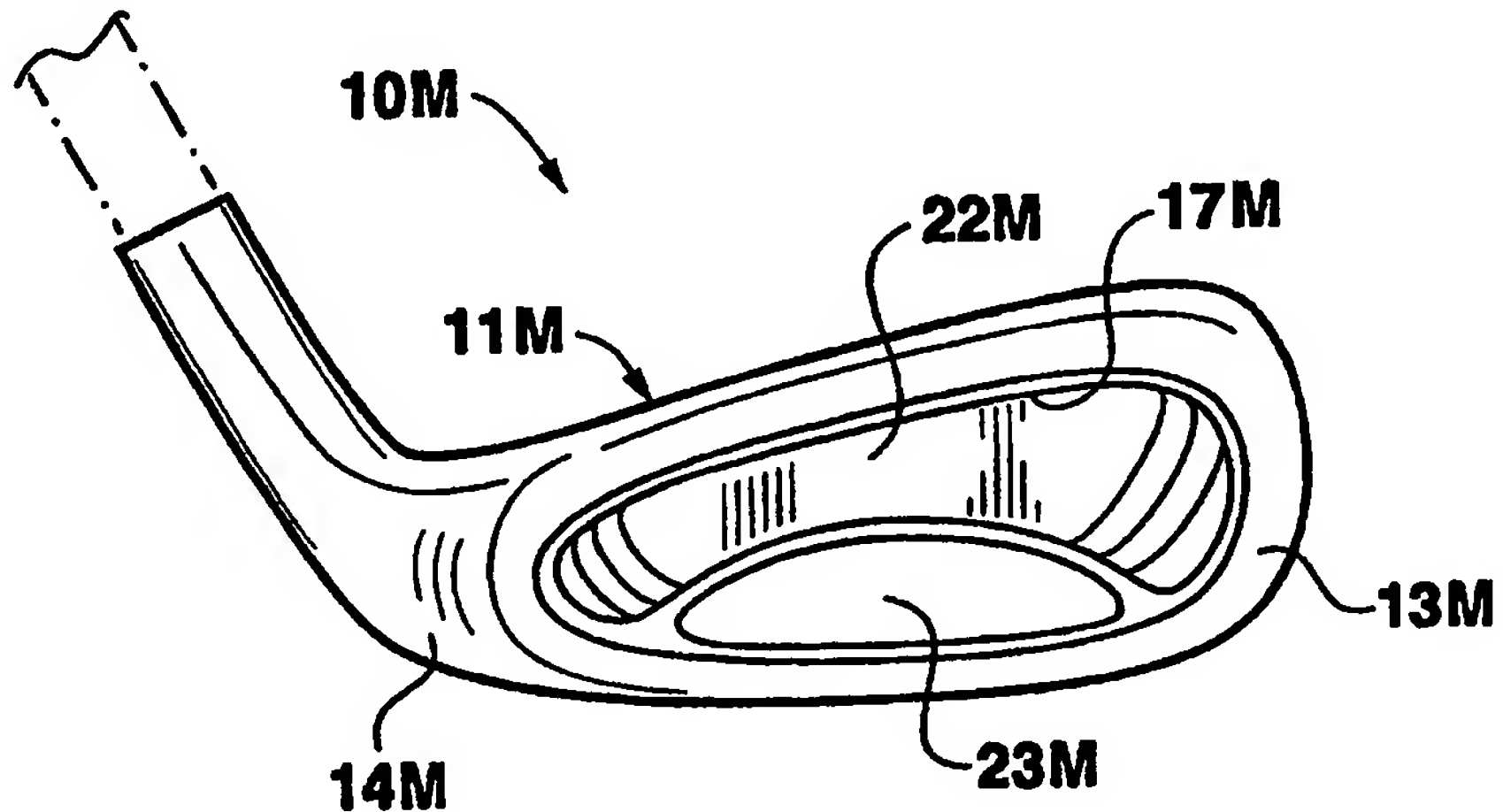
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(21) International Application Number: <b>PCT/US99/19157</b> (22) International Filing Date: <b>24 August 1999 (24.08.99)</b> (30) Priority Data: <b>09/139,308</b> <b>24 August 1998 (24.08.98)</b> <b>US</b> (71) Applicant: <b>ORLIMAR GOLF EQUIPMENT COMPANY, LLC [US/US]; 30826 Santana Street, Hayward, CA 94544 (US).</b> (72) Inventor: <b>ORTIZ, Jesse, J.; 315 Arden Road, Hillsborough, CA (US).</b> (74) Agent: <b>DALTON, Philip, A.; 236 West Portal Avenue, PMB #15, San Francisco, CA 94127-1423 (US).</b>		(81) Designated States: <b>AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</b>  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: **IRON GOLF CLUB HEAD AND CLUB**

(57) Abstract

An iron golf club head and club (10) are disclosed comprising a frame (11), maraging face insert (16) and copper tungsten muscle (23).



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## IRON GOLF CLUB HEAD AND CLUB

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## I. BACKGROUND OF THE INVENTION

## A. Field of the Invention

10           The present invention relates to golf clubs and, in particular, to so-called irons.

## B. Definition of Term(s) and Discussion of Existing Technology

15

As used here "iron" and refers to non-woods and includes numbered irons, pitching wedges, gap wedges, sand wedges, putters, etc..

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## II. SUMMARY OF THE INVENTION

25           In one aspect, the present invention is embodied in an iron golf club, comprising a substantially flat metal shell or frame including sole, toe, heel, rear and face sections, the face comprising a hole in the center thereof, and the frame including stepped sections of increasing front-to-rear thickness; a thin face member joined to the front of the frame over the hole therein; 30 and a weight or insert joined to the rear of the frame at a position along the shell cavity along the toe-to-heel, coordinated with the loft angle of the club. In another aspect, the face member is maraging metal. In yet another aspect, the face insert is 11% chrome, 11% nickel, carbon steel. In yet another aspect, the rear 35 weight is tungsten copper metal.

Other embodiments and arrangements are described in the accompanying specification and drawings.

5        **III. BRIEF DESCRIPTION OF THE DRAWING**

The present invention is described below with reference to the drawing, in which:

10        FIGURES 1-3 are front elevation views of, respectively, short, mid and long irons in accordance with the present invention.

15        FIGURES 4-6 are rear elevation views of, respectively, short, mid and long irons in accordance with the present invention.

20        FIGURES 7-9 are end (toe end) views of, respectively, short, mid and long irons in accordance with the present invention.

25        FIGURES 10-12 are end (heel end) views of, respectively, short, mid and long irons in accordance with the present invention.

**IV. DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

30        Referring to FIGS. 1-3, there are shown short, mid and long irons 10 in accordance with the present invention. Each iron comprises a metal shell or frame 11 in the shape of an iron and having the desired loft angle and lie and comprising sole 12, toe 13, heel 14, rear 15 and face 16 sections. Referring also to FIGS. 4-35        7, the face section 16 comprises a cavity or hole 17 in the mid portion thereof, and the frame 11 includes stepped sections 19, 20, 21 of increasing front-to-rear

thickness. A thin face plate or insert 22 is joined to the front of the frame over the hole 17 therein.

Preferably the face insert 22 is of maraging metal. A weight 23 is joined to the rear of the frame at a position along the dimension toe-to-heel coordinated with the loft angle of the club.

Preferably, the shell or frame 11 is 17-4 stainless steel. The multilevel, stepped shell provides perimeter weighting. The face insert 22 is alpha maraging metal, most preferably maraging 11% chrome, 11% nickel carbon steel. The Rockwell hardness (HRC) of the face insert is 52-55. The unsupported (supported peripherally, not in the mid, striding region) maraging metal insert is twice as strong and 85% harder than pure titanium, causing the ball to explode off the face, for increased distance. The distribution of weight away from the impact area creates boring trajectory which increases accuracy and distance.

Preferably, the muscle insert or weight 23 is tungsten copper, most preferably 70% tungsten, 30% copper by weight (50% tungsten, 50% copper by volume). The copper tungsten muscle is heavier than lead and creates a lower center of gravity to produce a higher launch angle. As shown in FIGS. 4-6, the copper tungsten weights are positioned low within the cavity rather than in the sole and is positioned in a selected progression toe-to-heel to promote tight shot patterns on heel and toe hits.

Metal epoxy is used to join the hosel and shaft together. Preferably, the face plate and the copper tungsten muscle 23 are joined to the body by brazing to provide effective joinder and to retain the strength and hardness of the metals. Presently, as shown in the following table the club 10 is made with loft angles

spanning the approximate range 13° to 55°. The stated hardness of the maraging steel is approximately twice the hardness of stainless steel. The tensile strength of the maraging metal is approximately 35% greater than the strength of B titanium. The tungsten copper metal is approximately 25%-30% heavier than the same volume of lead.

In short irons, the perimeter weighting increases accuracy and consistency. The position of the weight or muscle is proximate the heel to promote squareness of the blade at impact. In middle irons, the weight or muscle is positioned proximate the middle of the cavity, to promote both sole and perimeter weighting and provide improved combination of distance and accuracy. In long irons, a lower profile and lowest center of gravity facilitate getting the ball airborne. The weight or muscle is positioned at the toe end of the cavity, producing improved contact and playability on difficult to hit long iron shots.

TABLE

Loft and Lie for the TRIMETAL Irons

Club	Loft	Lie	Position of Weight
1	13°	56°	~Toe
2	16	57	"
3	19	58	"
4	22	59	~Middle
5	25	60	"
6	29	61	"
7	33	62	"
8	37	63	~Heel
9	41	64	"
PW	45	65	"
GW	50	65	"
SW	55	65	"

PW = pitching wedge, GW = gap wedge, SW = sand wedge

Having thus described preferred and alternative embodiments of the present invention, those of usual skill in the art will readily derive modifications and

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extensions within the scope of this invention and  
limited only by the extent of the present claims.

## WHAT IS CLAIMED IS:

1. An iron golf club, comprising a substantially flat metal frame including sole, toe, heel, rear and face sections, the face comprising a hole in the center thereof, and the frame including stepped sections of increasing front-to-rear thickness; a thin face member joined to the front of the frame over the hole therein; and a weight joined to the rear of the frame at a position along the dimension toe-to-heel coordinated with the loft angle of the club.

2. The iron golf club of claim 1, wherein the face member is maraging steel.

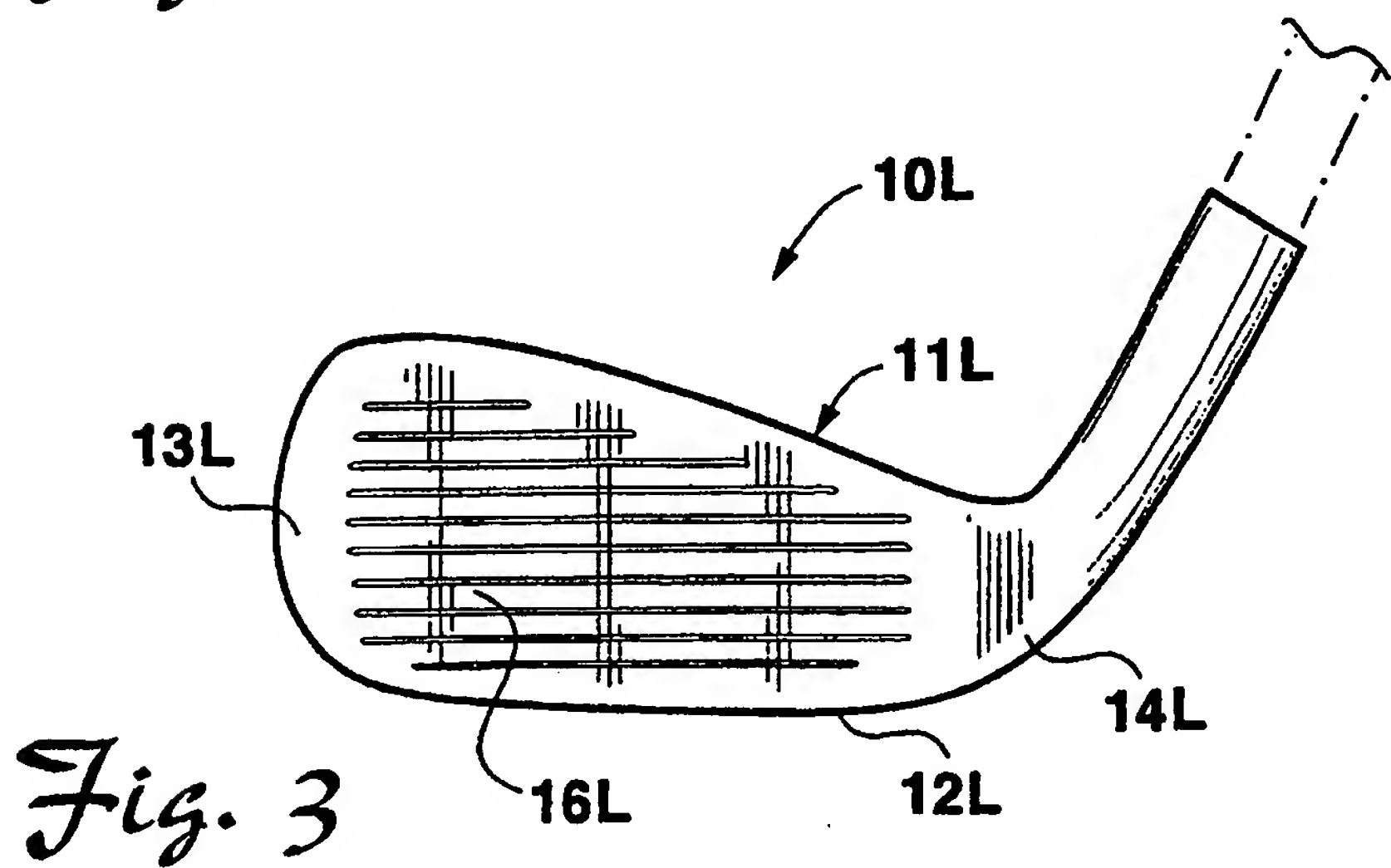
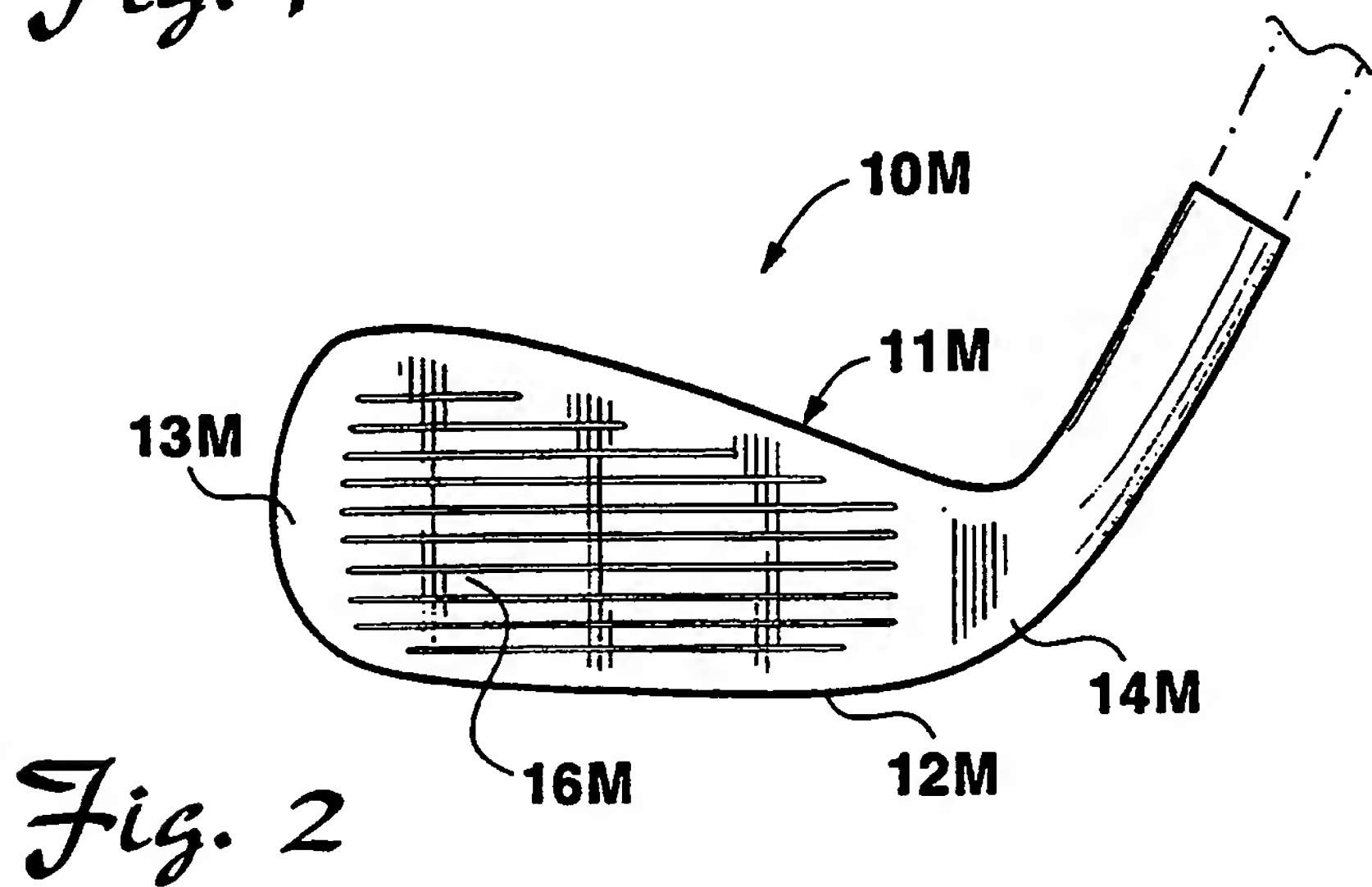
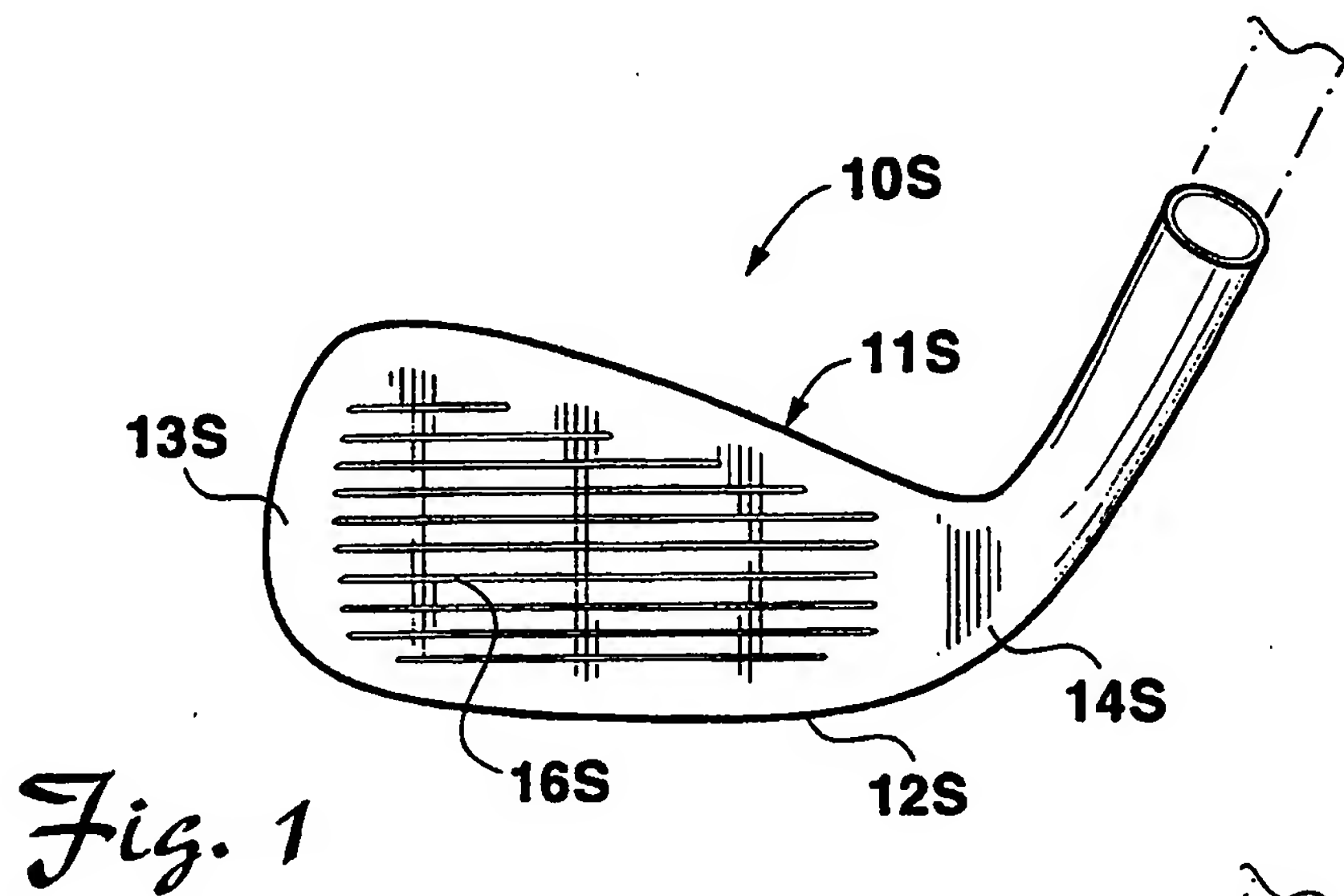
3. The iron golf club of claim 2, wherein the face insert is 11% chrome, 11% nickel, carbon steel.

4. The iron golf club of any of claim 1, 2 or 3, wherein the rear weight is tungsten copper metal.

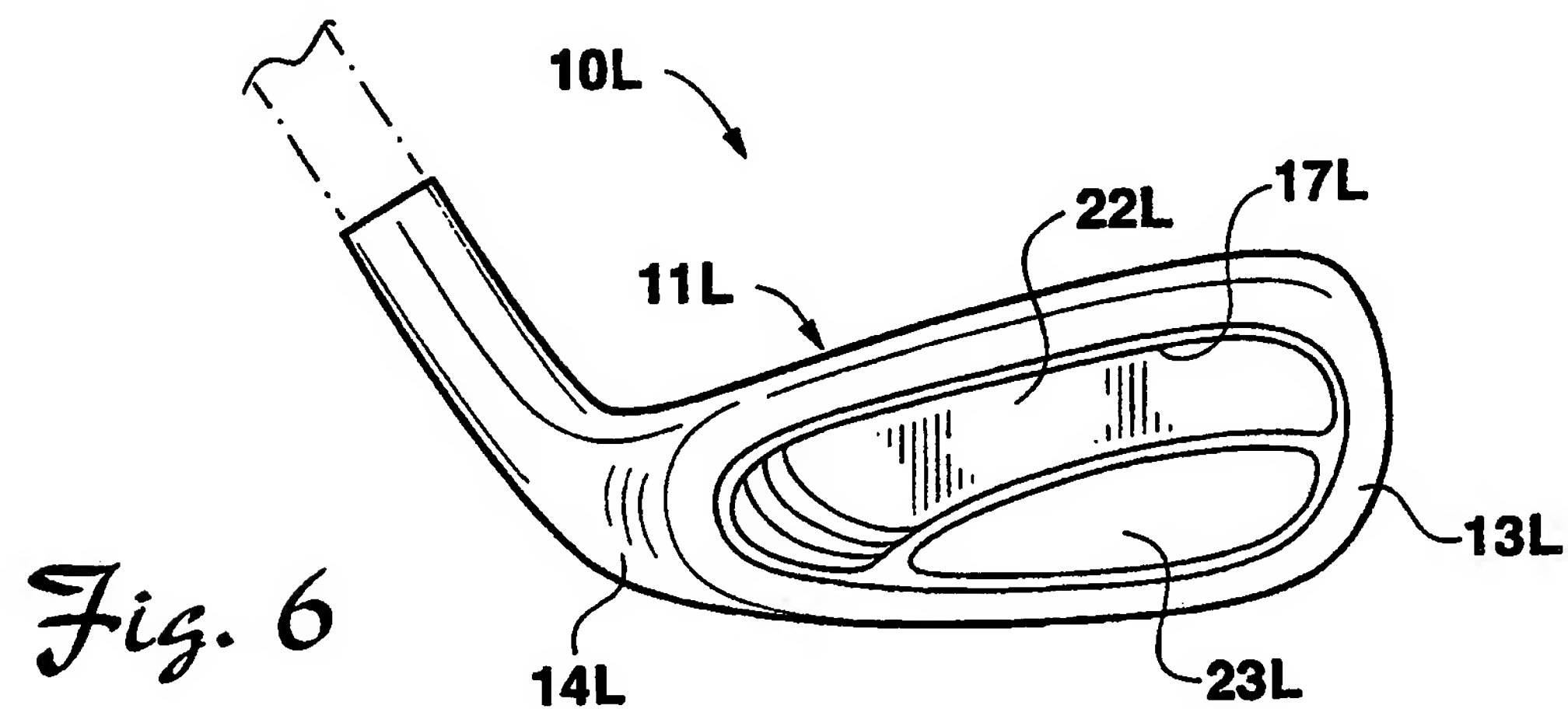
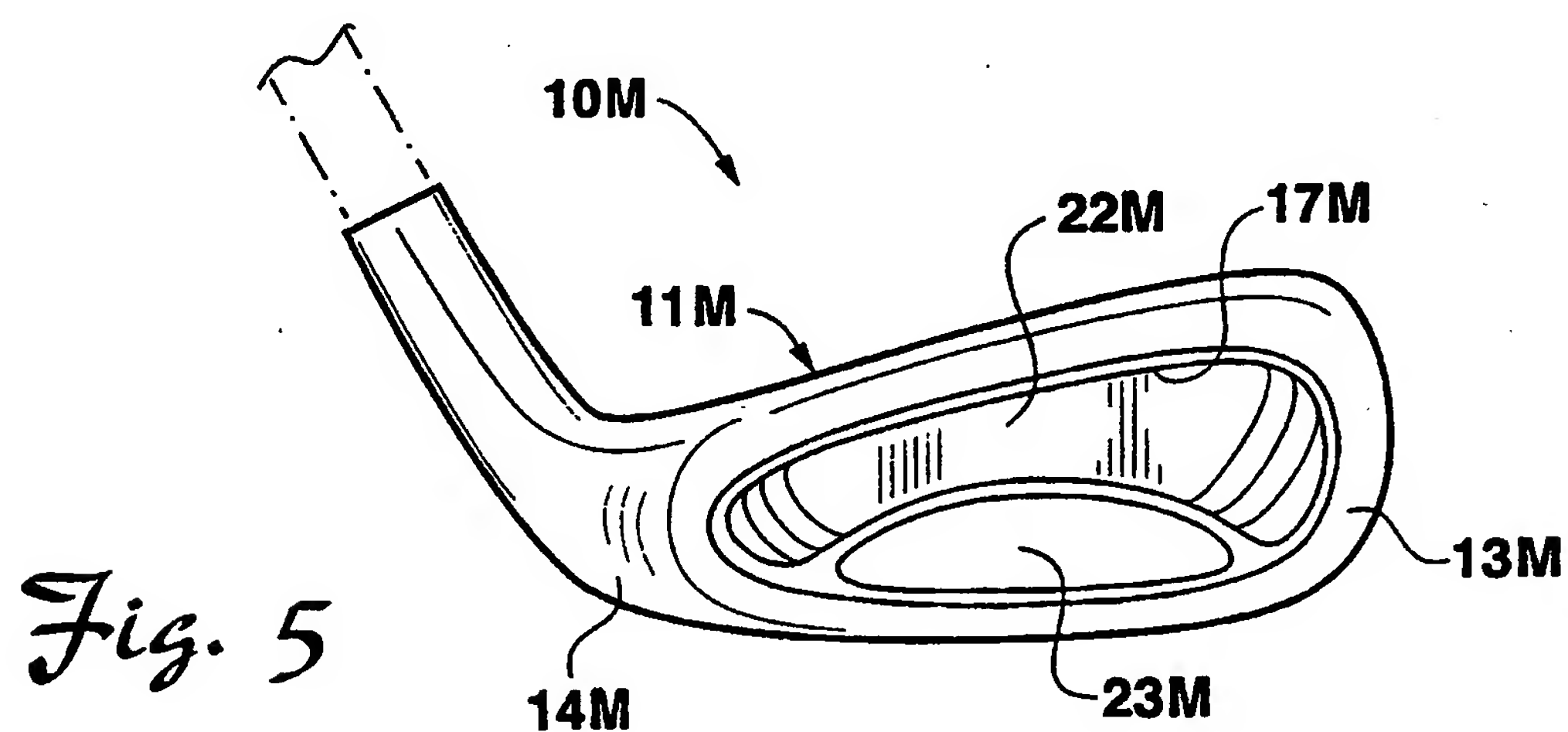
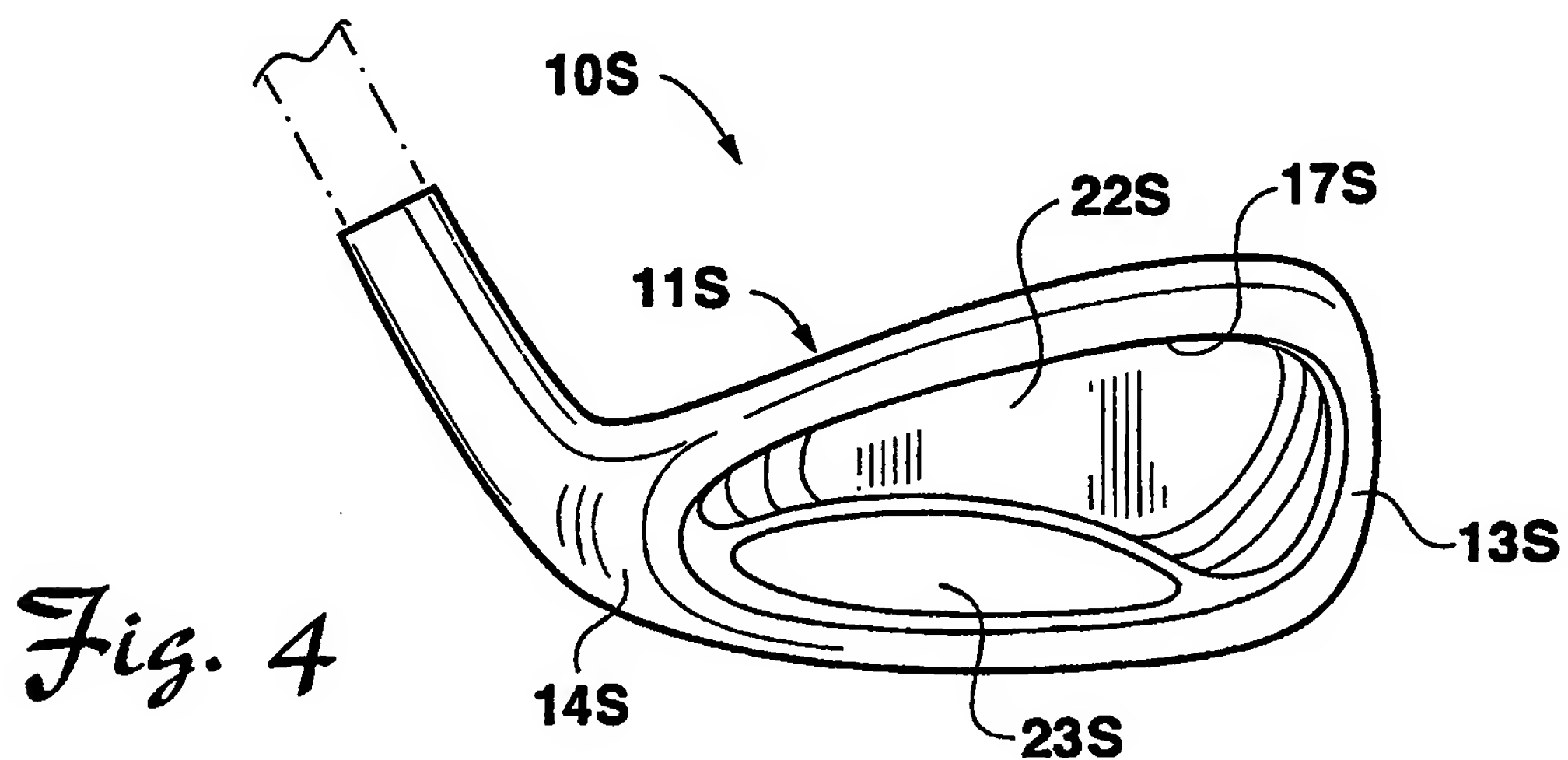
5. The iron golf club of any of claims 1, 2 or 3, wherein the rear weight is 70% tungsten, 30% copper by weight.



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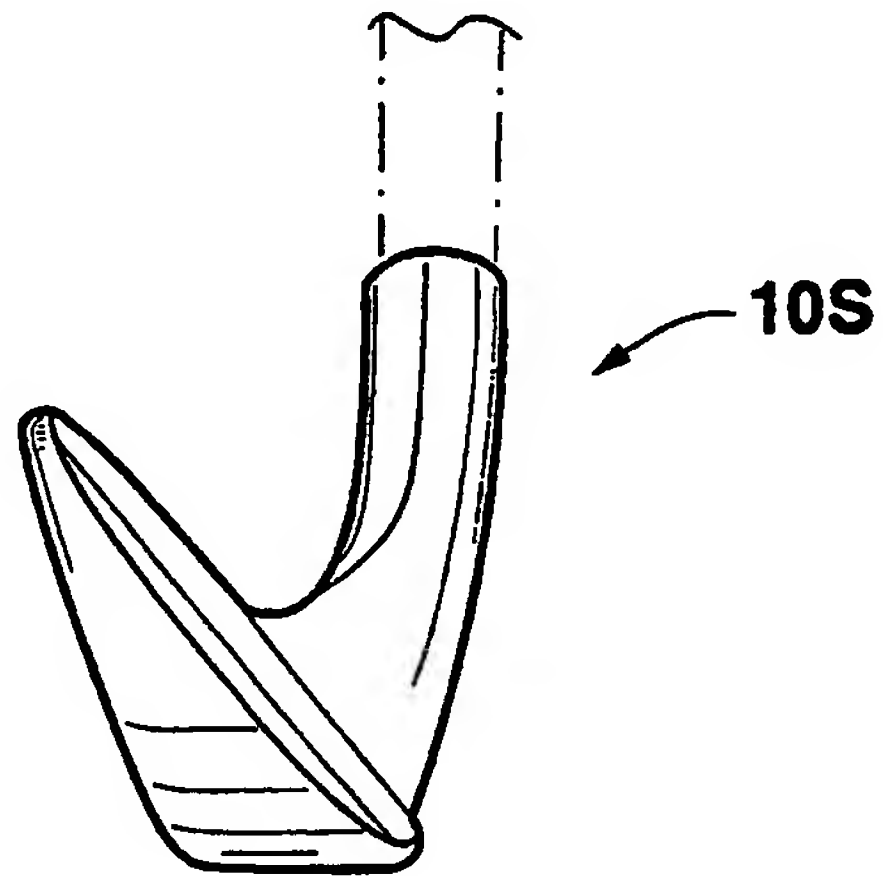
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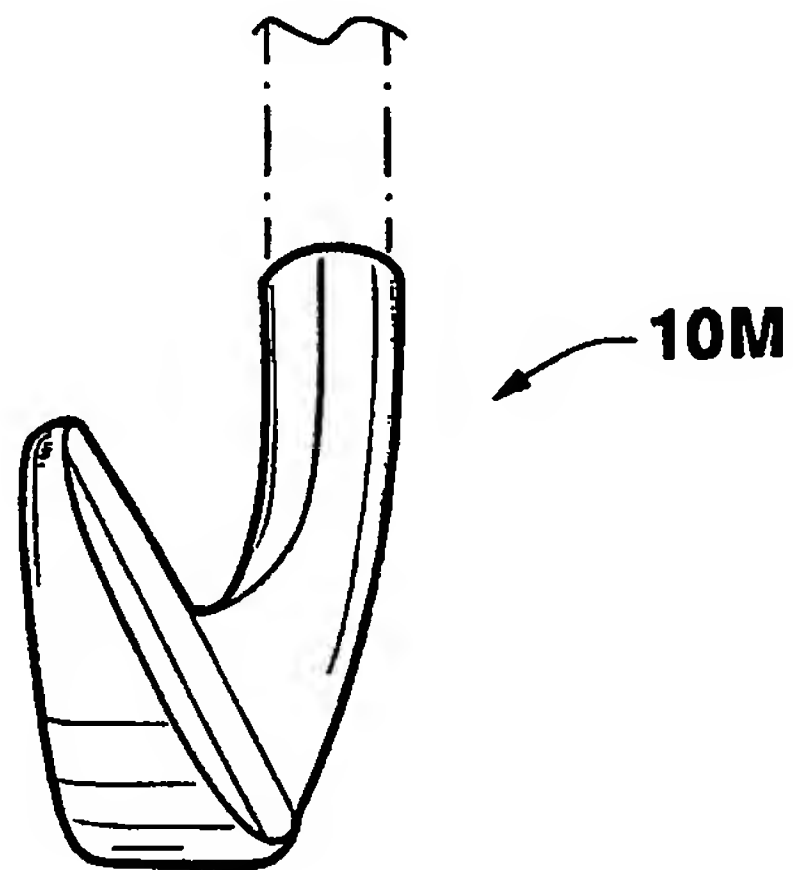
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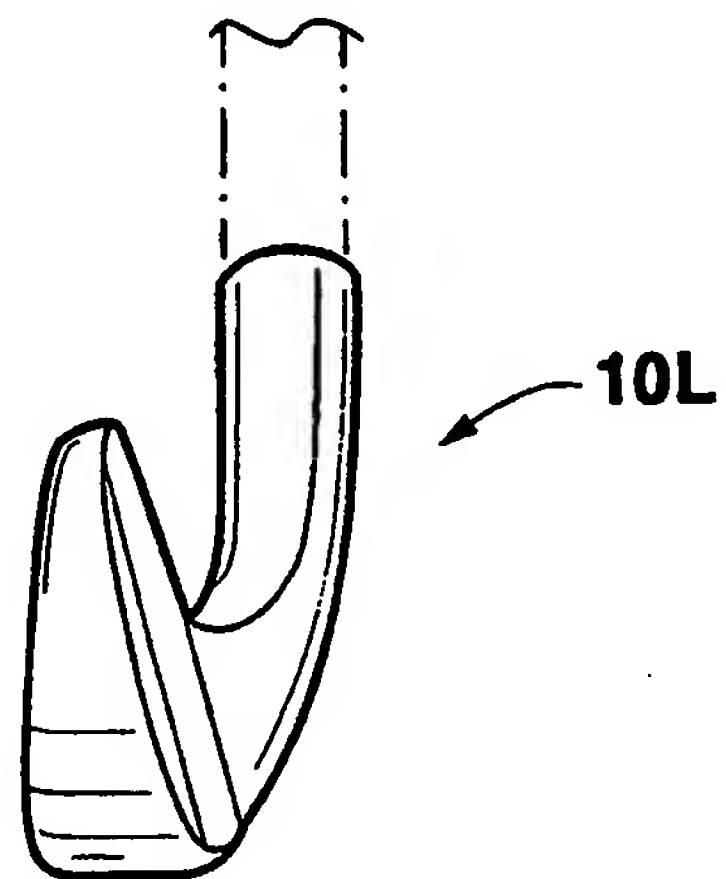
*Fig. 7*



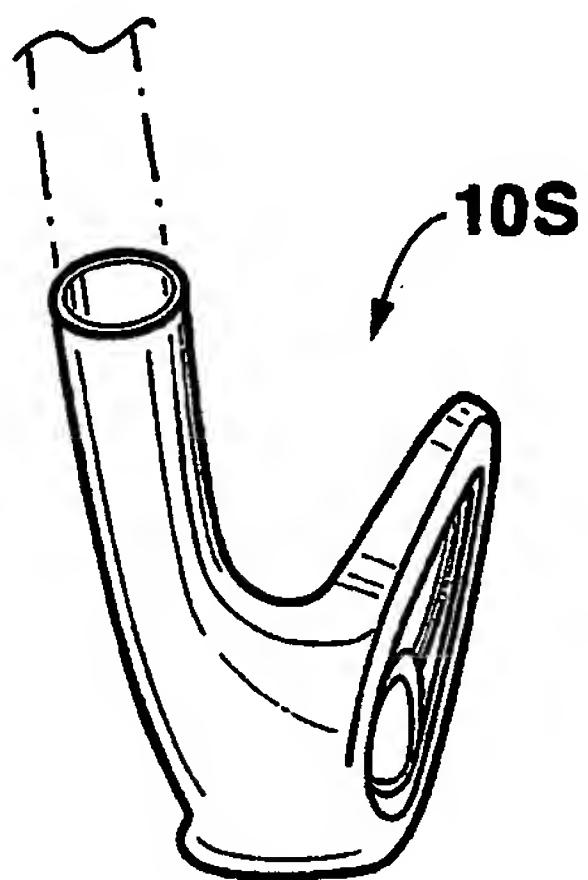
*Fig. 8*



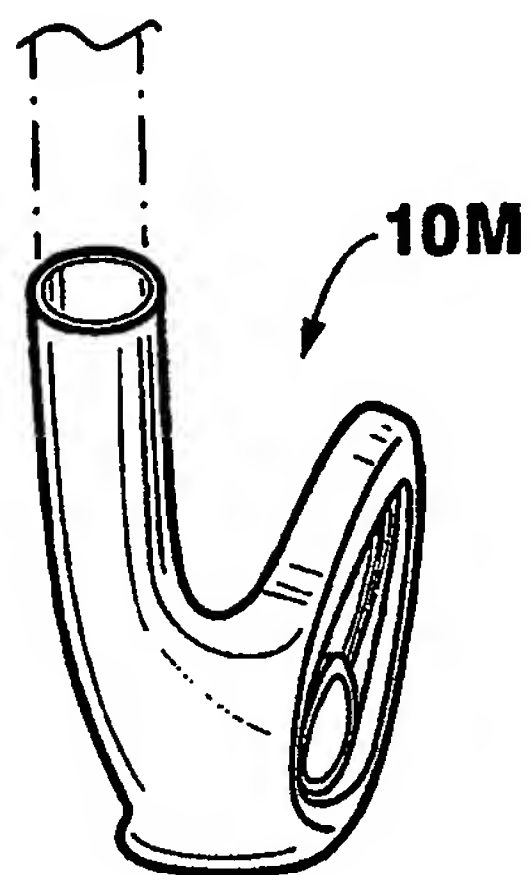
*Fig. 9*



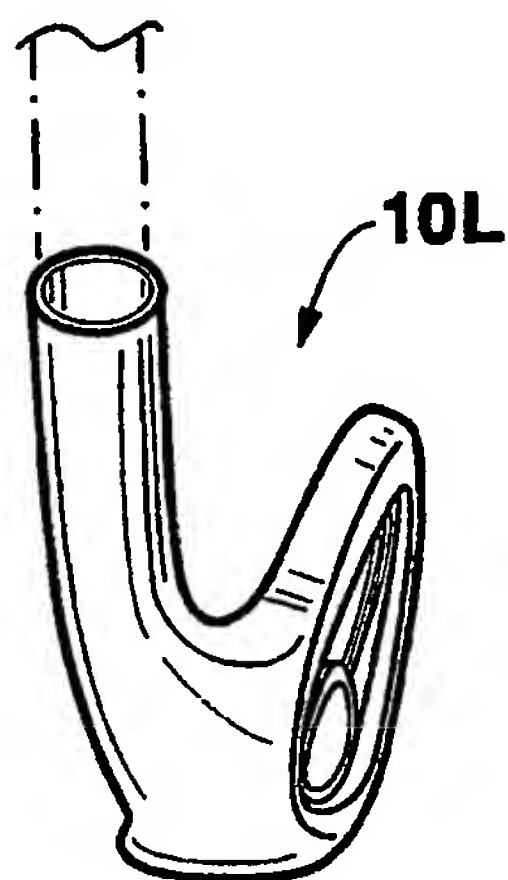
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*Fig. 10*



*Fig. 11*



*Fig. 12*

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/19157

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A63B 53/04

US CL : 473/324, 350, 291

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 473/324, 350, 291, 290, 325-349; D21/747-751

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
NONE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,420,156 A (CAMPAU) 13 December 1983, col. 4, lines 27-38.	1-5
Y	US 5,540,436 A (BOONE) 30 July 1996, col. 3, lines 12-55.	1-5
Y, E	US 5,871,408 A (CHEN) 16 February 1999, col. 2, lines 8-12.	2
Y	US 5,062,638 A (SHIRA) 05 November 1991, col. 5, lines 3-11 and Figure 11.	4, 5
Y, E	Pro Carbon Irons. Datasheet [online]. Nicklaus Golf Equipment, 1999 [retrived on 2000-01-03]. Retrieved from the Internet: <URL: <a href="http://www.nicklaus.com/equipment98/irons2.html">http://www.nicklaus.com/equipment98/irons2.html</a> > .	3

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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